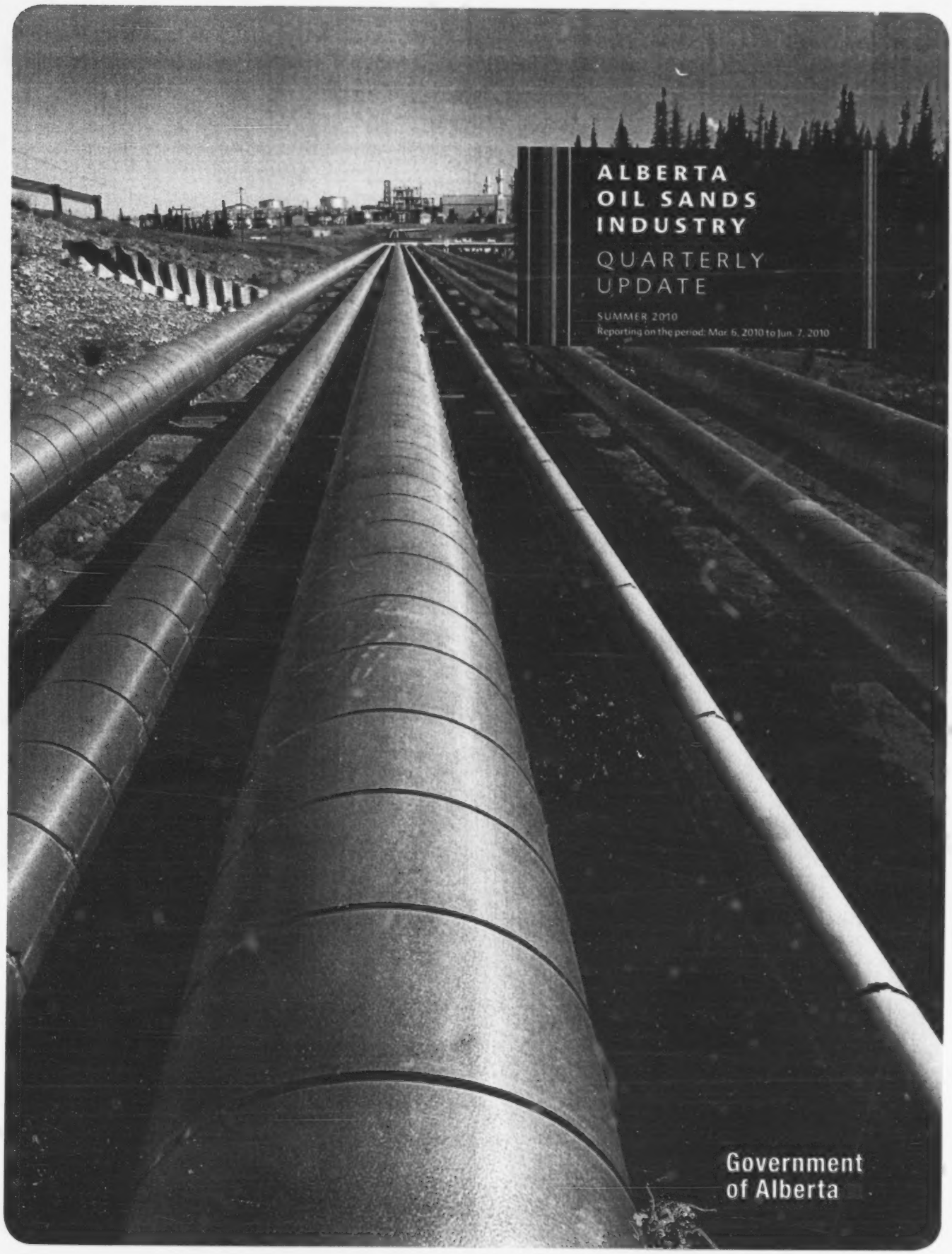

ALBERTA
OIL SANDS
INDUSTRY
QUARTERLY
UPDATE
SUMMER 2010
Reporting on the period: Mar. 6, 2010 to Jun. 7, 2010
Government
of Alberta

All about the oil sands

Background of an important global resource

TABLE OF CONTENTS

02 **All about the oil sands**
Background of an important global resource

03 **Mapping the oil sands**

04 **Government update**

06 **NEWS:**
What's new in the oil sands
Key updates from summer 2010

09 **Project listings**
Updated status of oil sands projects in Alberta

15 **Glossary of oil sands terms**

All photos © 2010, JuneWarren-Nickle's Energy Group

Alberta has the second-largest deposit of oil in the world—only Saudi Arabia can claim a larger stockpile of crude. But 170 billion of Alberta's 179 billion barrels of oil have the special quality of being bitumen, a resource that has been developed for decades but is only now coming into the forefront of the global energy industry, as conventional supplies—so-called "easy" oil—continue to be depleted. The figure of 170 billion barrels represents what is considered economically recoverable with today's technology, but with new technologies, this reserve estimate could be increased to as much as 315 billion barrels.

There are three major bitumen (or oil sands) deposits in Alberta. The largest is the Athabasca deposit, located in the province's northeast in the Regional Municipality of Wood Buffalo. The main population centre of the Athabasca deposit is the City of Fort McMurray. The second-largest oil sands deposit is referred to as Cold Lake, just south of Athabasca, with the main population centre the City of Cold Lake. The smallest oil sands deposit is known as Peace River, which is located in northwest central Alberta. A fourth deposit called Wabasca links to the Athabasca and is generally lumped in with that area.

The existence of bitumen in Alberta has been known for a long time. The first mention of it in Canadian history was in 1719, when a Cree named Wapasu brought a sample of the "gum" to a Hudson's Bay trading post. First Nations in what is now the Wood Buffalo area had traditionally used the bitumen, which seeps from outcrops along the Athabasca River, to waterproof their canoes.

Today bitumen is produced as an energy source by two means—mining and in situ. The majority of oil sands production is done by surface mining, but this will likely change in the future, as 80 per cent of Alberta's bitumen deposits are too deep underground to economically employ this technology.

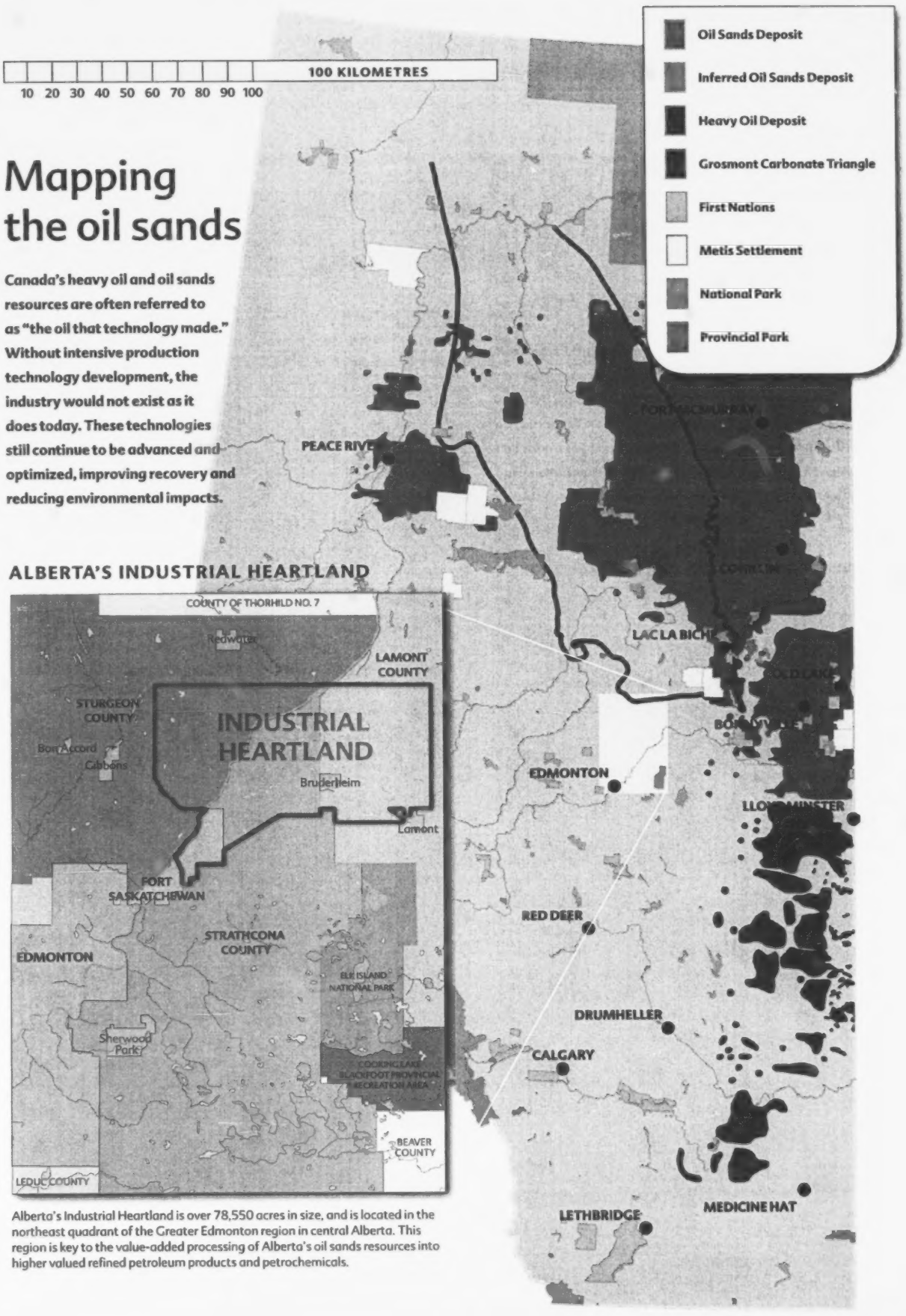
Right now there are essentially two commercial methods of in situ (Latin for "in place," essentially meaning wells are used rather than trucks and shovels). In cyclic steam stimulation (CSS), high-pressure steam is injected into directional wells drilled from pads for a period of time, then the steam is left to soak in the reservoir for a period, melting the bitumen, and then the same wells are switched into production mode, bringing the bitumen to the surface.

In steam assisted gravity drainage (SAGD), parallel horizontal well pairs are drilled from well pads at the surface. One is drilled near the top of the target reservoir, while the other is drilled near its bottom. Steam is injected into the top well, a steam chamber forms, and via gravity, the melted bitumen flows into the lower well and is pumped to the surface using artificial lift.

Both SAGD and CSS are used in the Cold Lake and Peace River deposits, while SAGD is the in situ technology of choice in the Athabasca deposit. The choice is based on a number of things including geology. The technologies combined currently produce just over one million barrels per day.

Research is underway on a number of other production technologies designed to optimize production and minimize water and energy use, including vapour extraction (VAPEX), and a form of in situ combustion known as toe to heel air injection (THAI).

Bitumen that has not been processed, or "upgraded," can be used directly as asphalt. It must be diluted to travel by pipeline. Adding value, some producers upgrade their product into synthetic crude oil (SCO), which is a refinery feedstock. At these refineries it can be transformed into transportation fuels and other products. ■

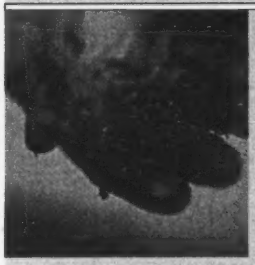


Mapping the oil sands

Canada's heavy oil and oil sands resources are often referred to as "the oil that technology made." Without intensive production technology development, the industry would not exist as it does today. These technologies still continue to be advanced and optimized, improving recovery and reducing environmental impacts.

Alberta's Industrial Heartland is over 78,550 acres in size, and is located in the northeast quadrant of the Greater Edmonton region in central Alberta. This region is key to the value-added processing of Alberta's oil sands resources into higher valued refined petroleum products and petrochemicals.

Government update



ALBERTA COMPETITIVENESS INITIATIVE

A new council of MLAs and industry leaders is working to ensure Alberta is one of the most attractive places to invest and do business as part of the Alberta Competitiveness Act.

This work is led by the Alberta Competitiveness Council, which is co-chaired by Premier Ed Stelmach and the Alberta Economic Development Authority's Bob Brawn, with Finance and Enterprise Minister Ted Morton as an alternate co-chair.

The council will look at ways to improve the overall economic position of the province and build on work already underway by government and industry. It will also look at the various factors that impact the province's economic growth, such as regulation and fiscal policy, the availability of skilled workers, transportation and infrastructure, and productivity and innovation. In addition to reviewing the province's overall economic competitiveness, the council will review four specific sectors this year: agriculture (grains and oil seeds), financial services, manufacturing, and petrochemicals.

The council is expected to release an interim report by the end of 2010. The report will outline the state of current initiatives, and include a framework for benchmarking and assessing Alberta's overall ability to compete. A second, more detailed report will be issued in 2011, with benchmarks and specific recommendations for improvement.

The council will work closely with industry to identify key areas for competitiveness improvement over the next several months. Albertans are invited to share their ideas through the Alberta government's new web portal: www.finance.alberta.ca/competitiveness.

NEW BITUMEN REFINERY PROJECT

Negotiations are underway to build a new bitumen refinery in Alberta's Industrial Heartland, as part of the government's bitumen royalty-in-kind initiative. The 150,000-barrel-per-day refinery proposed by North West Upgrading, to be built in three stages, will also include the application of technologies such as gasification and an integrated carbon capture and storage capability to reduce CO_2 emissions.

Processing of the bitumen will go beyond upgrading to synthetic crude oil, to include higher value products such as diesel fuel. Once completed, North West Upgrading would process 75,000 barrels per day of royalty-in-kind bitumen on behalf of the province.

The project was selected following a comprehensive review of proposals submitted to the Government of Alberta as a result of a request for proposals that was issued in July 2009 and closed in January 2010.

REGULATORY SYSTEM REVIEW

A broad range of stakeholders will have input into a comprehensive review of Alberta's oil and gas regulatory system to ensure that it is effective and supports a competitive economy. The review by the Regulatory Enhancement Task Force includes engagement of industry, landowner, municipal, and environmental groups. The meetings are an opportunity for stakeholders to provide input to the development of recommendations to improve the oil and gas regulatory system. Written submissions will also be accepted through an online tool, available at www.energy.alberta.ca/Initiatives/RegulatoryEnhancement.asp.

A progress report will be delivered to government by the task force in June. This will include progress on implementation of near-term regulatory enhancements; changes to support deployment of innovative, new technologies; and the process for comprehensive review of the regulatory system, with specific milestones and measurable objectives. A final task force report will be delivered to government by December 31.

CLEAN ENERGY RESEARCH

A $25-million provincial investment in a University of Calgary–anchored, nation-wide research network

will bring together more than 100 experts to advance clean energy development in Canada.

The funding of Carbon Management Canada helps establish national research teams that will develop technology and insights to reduce carbon emissions in Canada's fossil fuel energy sector—including the coal, natural gas, conventional oil, and oil sands sectors.

The funding is a result of Alberta's share of the Canada ecoTrust program, which allows provinces to choose projects that would have the most impact on clean air and climate change mitigation objectives.

Carbon Management Canada will be based at the University of Calgary. It will focus and mobilize at least 100 energy, environmental, and social science researchers from 21 Canadian universities. Research teams will work with partners in industry, government, non-government organizations, and major carbon management networks around the world.

SUPPORT FOR CLEAN ENERGY PRODUCTION

In order to promote more clean energy production in the province, the Alberta government is expanding and extending an incentive program for producers of bioenergy products.

Funding under the Bioenergy Producer Credit Program is extended for five years until 2016. The program will help Alberta meet its climate change targets by reducing emissions while also providing value-added opportunities and long-term stability to Alberta's agriculture and forestry industries. The program provides incentives to develop a wide variety of bioenergy products including fuels, power, and heat, which will support the Renewable Fuels Standard to be implemented in April 2011.

GREENHOUSE GAS REDUCTIONS

Alberta's greenhouse gas reduction program—which applies to all emitters over 100,000 tonnes—continues to support a global clean energy future with 2009 emissions reductions being the equivalent of removing 1.4 million cars off the road and a clean technology innovation fund growing to $187 million.

The 2009 results saw industrial emissions reduced by seven million tonnes from business-as-usual (emissions that would have otherwise existed in the absence of provincial regulations), and saw an additional $62.9 million invested in the technology fund that will soon support projects aimed at more renewable forms of energy and cleaner energy development. Companies also purchased 3.8 million tonnes of offset credits from Alberta projects that were able to reduce emissions.

NEW WEST PARTNERSHIP TRADE MISSION TO ASIA

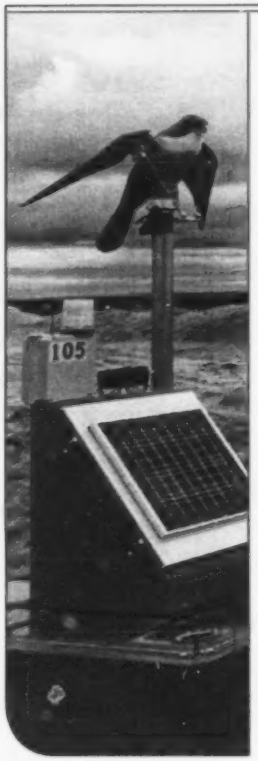
Premier Stelmach, along with his counterparts from both Saskatchewan and British Columbia were in Shanghai, Beijing, and Tokyo from May 14–22 to lead a joint trade mission to China and Japan, promoting trade and commercial opportunities between western Canada and Asia. Building on the partnership formed on April 30, the premiers promoted western Canada's clean technology, natural resources, and competitive investment climate to Asian business leaders and government officials.

PREMIER STELMACH VISIT TO U.S.

Premier Ed Stelmach's meetings with U.S. Senators in the first week of May have helped communicate the vital role Alberta's oil sands play in American energy security and job creation. During this visit, Premier Stelmach promoted the province's commitment to making even more progress on greenhouse gas reductions and discussed the province's leadership on advancing technologies like carbon capture and storage. Finally, the premier also used his opening address at the Energy Security Forum to reinforce that the oil sands contribute to job creation and economic growth in the United States. ■

What's new in the oil sands

Key updates from summer 2010



Penn West Energy Trust has entered into an agreement with a wholly owned subsidiary of the China Investment Corporation (CIC) to form a joint venture that will develop the trust's bitumen assets located in the Peace River area of northern Alberta with an $817-million investment by the Chinese corporation.

Headquartered in Beijing, CIC was founded in September 2007, as a wholly state-owned company incorporated in accordance with China's company law. Its mission is to make long-term investments that maximize risk-adjusted financial returns for the benefit of its shareholders.

Canadian Natural Resources says it produced 86,995 barrels per day of synthetic crude oil at its Horizon oil sands mine during the first quarter of 2010. March production averaged 103,850 barrels per day, the highest this year.

The company said it continues to target stable production levels with annual production guidance for 2010 remaining at 90,000 to 105,000 barrels per day.

As for the next expansion phases at Horizon, Raymond James notes that Canadian Natural is determined to proceed.

"The company [is] adamant that it will expand Horizon," analysts wrote in a research note following Canadian Natural's May investor open house. "Work is progressing on the various tranches that make up the Phases 2/3 expansion, including engineering and procurement and updated cost estimates.... The company did indicate that prior to sanctioning, it requires cost certainty and economics that can compete for capital within the portfolio."

The University of Calgary's Schulich School of Engineering is launching a new heavy oil research program designed to map the characteristics of the viscous resource in order to improve production. Much of the work will look at solvent processes, techniques that industry is growing increasingly interested in to help reduce water and energy use. But the industry work is early stages, and support is needed to maintain the momentum of solvents.

"If they have a lot of failures, that could kill [interest in] it. That's what we're trying to avoid," says program lead Harvey Yarranton, who holds the Natural Sciences and Engineering Research Council of Canada (NSERC) industrial research chair in heavy oil properties and processing.

His work, which is supported by partners Schlumberger and Shell Canada, has in place $2.6 million in funding over the next five years.

Alberta's mined synthetic crude oil production is still struggling to meet output targets. First-quarter volumes dropped 10 per cent to 575,795 barrels per day, down from 639,600 barrels per day in the first three months of 2009 as miners were beset with various problems, including fires. The main reason for the drop this year was a big decline in Suncor Energy's output.

In situ production is moving closer to volumes of synthetic crude (mostly from mining) as commercial-scheme bitumen output has topped 500,000 barrels per day so far this year with February in situ production over 543,000 barrels per day.

A long-awaited deal is on the table for ConocoPhillips' nine per cent stake in the Syncrude mining joint venture. The Houston-based company has entered into definitive agreements with subsidiaries of Sinopec to sell its minority ownership of Canada's largest oil production operation for $4.65 billion.

The transaction is anticipated to close in the third quarter of 2010 once Canadian and Chinese government approvals are obtained.

ConocoPhillips has the fourth-largest interest in Syncrude after the 36.74 per cent held by Canadian Oil Sands Trust, Imperial Oil Resources (25 per cent), and Suncor Energy (12 per cent). Nexen has a 7.2 per cent interest, while Mocal Energy and Murphy Oil Company each have five per cent.

Sinopec is also a 50 per cent owner of the proposed Northern Lights oil sands mining project along with Total E&P Canada.

Athabasca Oil Sands Corp. (AOSC) is now a publicly traded company, reporting the closing of its initial public offering of 75 million common shares at a price of $18 per share for gross proceeds of $1.35 billion.

With a number of different oil sands plans in various stages of development, AOSC also just closed a $1.9-billion transaction that makes it a joint-venture owner with PetroChina in its Dover and MacKay River projects.

Connacher Oil and Gas has completed construction of its second steam assisted gravity drainage (SAGD) project at Great Divide in northeastern Alberta.

Algar has a design steam generation capacity of 30,000 barrels per day, which at its long-term target peak operating steam to oil ratio of 3:1, is anticipated to facilitate production of 10,000 barrels per day of bitumen over a project life of more than 25 years.

Major civil work at Algar, including construction of the plant site, access road, and well pads, was completed in February 2009. Project field construction and fabrication commenced on July 7, 2009. Drilling of the 17 SAGD well pairs at Algar and concurrent construction of the steam generation facility and oil processing plant were completed in 273 working days, less than the company's target of 275 working days.

Capital expenses are still being accumulated and won't be final until after commissioning of the project. Connacher anticipates the total construction costs of Algar will be under its announced $375-million budget.

Sunshine Oilsands has submitted a regulatory application to develop a commercial SAGD project at its West Ells location. When completed, the facility is expected to operate at an average capacity of 10,000 barrels per day over a design life of 30 years.

"This submission is a material event for our company and forms part of our objectives to achieve 180,000 barrels per day of in situ bitumen production from our lands as we see them today," co-CEO Doug Brown said in a news release. "We have worked with regulators to ensure our submission speaks to today's key issues, and with a competent response to their concerns, we believe this 10,000-barrel-per-day application can be resolved in 2011."

Canadian Phoenix Resources' controlled subsidiary Serrano Energy has closed the sale of its 20 per cent working interest in the proposed Blackrod SAGD project for $21 million with an effective date of Jan. 1, 2010.

Existing 80 per cent owner BlackPearl Resources is taking the remaining stake, funding the acquisition from working capital. The company plans to start construction on the 600-barrel-per-day initial pilot later this year.

Nexen, Japan Canada Oil Sands, and the joint venture of ConocoPhillips Canada and Total E&P Canada are joining with the Regional Municipality of Wood Buffalo in a campaign designed to boost safety on highways that have been called the most dangerous in Alberta.

The Coalition for a Safer 63 & 881 will "target tunnel-vision driving," a problem that has been linked to hundreds of vehicle-related injuries and dozens of fatalities along oil sands Highways 63 and 881. Basically, the group says tunnel vision is "a mindset that says, 'It's time to get moving to my destination now and nothing will stop me.'" The campaign will be comprised of print advertising, posters, billboards, and the website www.safer63and881.com.

Southern Pacific Resource Corp. reports that after a successful winter drilling program and further technical evaluation of its oil sands lands in McKay, Alberta, the estimate of the gross probable recoverable bitumen reserves has increased by 149 per cent to 168.1 million barrels. This equates to a net present value before tax of $368 million (discounted at 10 per cent).

Additionally, 116.7 million barrels of recoverable bitumen have been assigned to the gross best estimate (P50) contingent resources category. These numbers come from report by GLJ Petroleum Consultants, effective March 15, 2010, incorporating the past winter's 21 new core holes drilled in the McKay area, plus all of the technical data and studies collected and analyzed over the past three winters.

Enbridge has filed the application for its proposed Northern Gateway pipeline, a $4.5-billion project that would see a 1,200-kilometre, 525,000-barrel-per-day line carry oil sands crude to the Kitimat area on British Columbia's north Pacific Coast, while a parallel line will carry ultra-light crudes back to the oil sands region for blending. The crude landing at Kitimat would then be loaded onto tankers for export overseas. Enbridge foresees that construction could begin in 2013, but the project is facing opposition in British Columbia.

Excelsior Energy has completed an updated independent evaluation of bitumen resources on its Hangingstone property near Fort McMurray, Alberta. The company has drilled a total of 55 wells on the Hangingstone property, where it has a 75 per cent working interest in 39 contiguous sections of oil sands rights.

"The valuation for the best-case contingent resources using a 10 per cent discount is $332 million to Excelsior's working interest share, a 60 per cent increase from the July 1, 2010 evaluation, and $708 million for the ➤

high-estimate contingent resources," said company president David Winter in a news release.

Excelsior has also entered into a binding letter agreement with Frank Giustra, Peninsula Merchant Syndications, and Jeff Scott to arrange for subscriptions of up to 41.67 million units of Excelsior at a price of $0.36 per unit for aggregate gross proceeds of up to $15 million. Proceeds from the unit financing and the common share financing are intended to be used for further delineation of the corporation's property in the Hangingstone area of Alberta and for general corporate purposes.

■ Oklahoma City–based Devon Energy plans to spend US$650 million in a joint venture to develop BP's Alberta oil sands leases at Kirby, adjacent to Devon's successful Jackfish in situ project.

In order to facilitate the joint venture, it will acquire 50 per cent of BP's interest in the leases. Devon, which will operate the project, will pay BP US$500 million at closing and commit to fund an additional US$150 million of capital costs on BP's behalf over the next three years. Devon and BP have also agreed to negotiate a long-term heavy-crude sales agreement for Devon's share of Kirby production. "Given our extensive knowledge of the area and our view of the potential of the Kirby lease, it is an asset we have been interested in for some time, so we view this as an exciting opportunity," said Dave Hager, Devon's executive vice-president of exploration and production, in a conference call. "While much work remains to be done to fully delineate the Kirby lease, we believe this will prove to have greater resource potential than Jackfish." Devon believes that ultimately there may be recoverable resources of up to 1.5 billion barrels of oil. Hager says the company envisions the Kirby leases will be developed through a multi-phased development plan similar to the Jackfish SAGD development. Devon is looking at moving the first phase of a Kirby project forward within the next year.

■ Privately held Value Creation Inc. (VCI) has entered into a partnership with BP Canada that will be the majority partner and the operator for the Terre de Grace in situ project on VCI leases in the Athabasca region of northeastern Alberta.

BP and VCI also are in discussions to enter into a separate cooperation agreement for further development and testing of Value Creation's proprietary primary upgrading technology, the accelerated decontamination process that removes asphaltenes, creating a decontaminated oil, a clean medium density oil that would require little diluent.

VCI already has regulatory approval for a 10,000-barrel-per-day project on a 741-hectare site on the Terre de Grace lease.

■ The Northern Alberta Institute of Technology (NAIT) is creating its first-ever research chair, with help from a $1.5-million investment by Ledcor Industrial. The funding will be matched by $3 million from NAIT. The position, applied research chair in oil sands environmental sustainability, will focus on applying green chemistry and engineering principles in oil sands production.

"If we are to truly make practices in the oil sands sustainable, we need to make changes now," says Don Breen, president of Ledcor. "It is Ledcor's expectation that the applied research chair at NAIT and the work that they conduct will help identify practices and processes that are of material benefit to the industry and can be applied to enhance and improve our operations in the oil sands."

The chair will be designed to develop "real-world solutions" that can be integrated with new and existing operations.

■ Early-stage junior Grizzly Oil Sands, under the leadership of former Devon Energy heavy oil manager John Pearce, has filed the regulatory application for the first phase of its proposed Algar Lake SAGD project.

Along with 25 per cent partner Gulfport Energy, Grizzly is seeking approval to construct and operate the project, which is expected to average 10,000 barrels per day over the next 30 years. It will have two plant phases, each producing 5,000 barrels per day.

Each phase is estimated to carry an initial gross capital cost of approximately US$120 million. In order to maintain consistent production, an additional pad will be required for each phase every five years at an estimated gross cost of US$35 million per pad.

Grizzly expects receipt of approvals from the regulators within 12 to 18 months. Upon approval, it anticipates first production within approximately 18 months.

■ In situ developer Osum Oil Sands has been assigned proved-plus-probable reserves of 320 million barrels in an engineering evaluation by GLJ Petroleum Consultants. Instrumental in the reserves booking was the fact that the company has submitted to regulators a commercial application for its proposed 35,000-barrel-per-day Taiga project in the Cold Lake region of Alberta. Taiga leases have been fully delineated to commercial project approval requirements. Says Osum chief executive officer and chairman Richard Todd, "This proved-plus-probable reserves designation is reflective of the de-risking of Osum's high-quality Taiga project at Cold Lake."

■ A public hearing to discuss Total E&P Canada's planned upgrader was held in June by the Energy Resources Conservation Board. The company is seeking authorization to construct in Strathcona County a 295,000-barrel-per-day upgrader in three phases. It is expected that at full capacity, the Total Upgrader will process and convert 295,000 barrels per day of bitumen into light, sweet synthetic crude oil. ■

Project listings

Updated status of oil sands projects in Alberta

As of June 1, 2010.

TECHNOLOGY LEGEND

COGD	Combustion overhead gravity drainage
CSS	Cyclic steam stimulation
ET-DSP	Electro-thermal dynamic stripping process
N-SOLV	Heated solvent vapour extraction
SAGD	Steam assisted gravity drainage
THAI	Toe to heel air injection

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	[illegible]	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
ATHABASCA REGION – IN SITU						
ALBERTA OILSANDS						
Clearwater West	Pilot	4,500	2011	Application	Alberta Oilsands has received its first reserves assessment for the Clearwater West project area. Ryder Scott has assigned 2P reserves of 16.3 million and 3P reserves of 67.6 million barrels.	SAGD
	Commercial Project	15,000	TBD	Announced		SAGD
ATHABASCA OIL SANDS						
MacKay River	Phase 1	35,000	2014	Announced	AOSC has completed its 2010 winter program, including drilling 52 wells and shooting 21 square kilometres of 3-D seismic in its 40 per cent owned Dover area.	SAGD
	Phase 2	40,000	2017	Application		SAGD
	Phase 3	40,000	2019	Application		SAGD
	Phase 4	35,000	2012	Application		SAGD
Dover	Phase 1	TBD	2015	Announced		SAGD
BLACKPEARL RESOURCES						
Blackrod	Pilot	600	TBD	Application	BlackPearl says it plans to build the SAGD pilot at Blackrod later this year or early next. Construction of a 31-kilometre all-weather road to proposed site is complete, along with water source well, disposal well, and two observation wells. Engineering ongoing.	SAGD
CANADIAN NATURAL RESOURCES						
Birch Mountain East	Phase 1	60,000	2016	Announced	Canadian Natural is proceeding with detailed engineering and design, and plans to sanction and scope in late 2010.	TBA
Gregoire Lake 1	Phase 1	60,000	2018	Announced		TBA
Gregoire	Phase 1	60,000	2014	Announced		TBA
Kirby	Phase 1	45,000	2012	Application		SAGD
Leismer	Phase 1	30,000	2018	Announced		TBA
CENOVUS ENERGY						
Borealis	Phase A	35,000	TBD	Application	Approximately 200 delineation wells have been drilled in the greater Borealis area as of Dec. 2009. Cenovus continues to evaluate the region in support of the project.	SAGD
	Phase B	32,500	TBD	Announced		SAGD
	Phase C	32,500	TBD	Announced		SAGD
Christina Lake	Phase 1A	10,000	2002	Operating	Approvals for E, F, and G are expected in 2011, and a wedge-well pilot has been launched at Christina Lake.	SAGD
	Phase 1B	8,800	2008	Operating		SAGD
	Phase 1C	40,000	2011	Construction		SAGD
	Phase 1D	40,000	2013	Approved		SAGD
	Phase 1E	40,000	TBD	Application		SAGD
	Phase 1F	40,000	TBD	Application		SAGD
	Phase 1G	40,000	TBD	Application		SAGD
Narrows Lake	Phase A	40,000	TBD	Announced	Cenovus plans to submit the application for Narrows Lake by the end of Q2.	SAGD
	Phase B	80,000	TBD	Announced		SAGD
Foster Creek	Phase 1A	24,000	2001	Operating	The Foster Creek project has achieved payout for royalty purposes, the result of cumulative project revenue exceeding cumulative project allowable costs. Cenovus says achieving payout is a reflection of strong operational performance and a superior resource. Approvals of phases F, G, and H are expected later this year. 12 per cent of production now comes from wedge wells.	SAGD
	Debottlenecking	6,000	2003	Operating		SAGD
	Phase 1C – Stage 1	10,000	2005	Operating		SAGD
	Phase 1C – Stage 2	20,000	2007	Operating		SAGD
	Phase 1D	30,000	2009	Operating		SAGD
	Phase 1E	30,000	2009	Operating		SAGD
	Phase 1F	30,000	2016	Application	Phases F, G, and H continue to move through the regulatory process.	SAGD
	Phase 1G	30,000	2017	Application		SAGD
	Phase 1H	30,000	TBD	Application		SAGD
CHEVRON CANADA						
Ells River		100,000	TBD	Announced	Chevron has decided to place Ells River on hold. The company does not believe the project will provide the necessary returns in the foreseeable future to compete for capital investment relative to others in its global portfolio.	TBA

high-estimate contingent resources," said company president David Winter in a news release.

Excelsior has also entered into a binding letter agreement with Frank Giustra, Peninsula Merchant Syndications, and Jeff Scott to arrange for subscriptions of up to 41.67 million units of Excelsior at a price of $0.36 per unit for aggregate gross proceeds of up to $15 million. Proceeds from the unit financing and the common share financing are intended to be used for further delineation of the corporation's property in the Hangingstone area of Alberta and for general corporate purposes.

■ Oklahoma City–based Devon Energy plans to spend US$650 million in a joint venture to develop BP's Alberta oil sands leases at Kirby, adjacent to Devon's successful Jackfish in situ project.

In order to facilitate the joint venture, it will acquire 50 per cent of BP's interest in the leases. Devon, which will operate the project, will pay BP US$500 million at closing and commit to fund an additional US$150 million of capital costs on BP's behalf over the next three years. Devon and BP have also agreed to negotiate a long-term heavy-crude sales agreement for Devon's share of Kirby production. "Given our extensive knowledge of the area and our view of the potential of the Kirby lease, it is an asset we have been interested in for some time, so we view this as an exciting opportunity," said Dave Hager, Devon's executive vice-president of exploration and production, in a conference call. "While much work remains to be done to fully delineate the Kirby lease, we believe this will prove to have greater resource potential than Jackfish." Devon believes that ultimately there may be recoverable resources of up to 1.5 billion barrels of oil. Hager says the company envisions the Kirby leases will be developed through a multi-phased development plan similar to the Jackfish SAGD development. Devon is looking at moving the first phase of a Kirby project forward within the next year.

■ Privately held Value Creation Inc. (VCI) has entered into a partnership with BP Canada that will be the majority partner and the operator for the Terre de Grace in situ project on VCI leases in the Athabasca region of northeastern Alberta.

BP and VCI also are in discussions to enter into a separate cooperation agreement for further development and testing of Value Creation's proprietary primary upgrading technology, the accelerated decontamination process that removes asphaltenes, creating a decontaminated oil, a clean medium density oil that would require little diluent.

VCI already has regulatory approval for a 10,000-barrel-per-day project on a 741-hectare site on the Terre de Grace lease.

■ The Northern Alberta Institute of Technology (NAIT) is creating its first-ever research chair, with help from a $1.5-million investment by Ledcor Industrial. The funding will be matched by $3 million from NAIT. The position, applied research chair in oil sands environmental sustainability, will focus on applying green chemistry and engineering principles in oil sands production.

"If we are to truly make practices in the oil sands sustainable, we need to make changes now," says Don Breen, president of Ledcor. "It is Ledcor's expectation that the applied research chair at NAIT and the work that they conduct will help identify practices and processes that are of material benefit to the industry and can be applied to enhance and improve our operations in the oil sands."

The chair will be designed to develop "real-world solutions" that can be integrated with new and existing operations.

■ Early-stage junior Grizzly Oil Sands, under the leadership of former Devon Energy heavy oil manager John Pearce, has filed the regulatory application for the first phase of its proposed Algar Lake SAGD project.

Along with 25 per cent partner Gulfport Energy, Grizzly is seeking approval to construct and operate the project, which is expected to average 10,000 barrels per day over the next 30 years. It will have two plant phases, each producing 5,000 barrels per day.

Each phase is estimated to carry an initial gross capital cost of approximately US$120 million. In order to maintain consistent production, an additional pad will be required for each phase every five years at an estimated gross cost of US$35 million per pad.

Grizzly expects receipt of approvals from the regulators within 12 to 18 months. Upon approval, it anticipates first production within approximately 18 months.

■ In situ developer Osum Oil Sands has been assigned proved-plus-probable reserves of 320 million barrels in an engineering evaluation by GLJ Petroleum Consultants. Instrumental in the reserves booking was the fact that the company has submitted to regulators a commercial application for its proposed 35,000-barrel-per-day Taiga project in the Cold Lake region of Alberta. Taiga leases have been fully delineated to commercial project approval requirements. Says Osum chief executive officer and chairman Richard Todd, "This proved-plus-probable reserves designation is reflective of the de-risking of Osum's high-quality Taiga project at Cold Lake."

■ A public hearing to discuss Total E&P Canada's planned upgrader was held in June by the Energy Resources Conservation Board. The company is seeking authorization to construct in Strathcona County a 295,000-barrel-per-day upgrader in three phases. It is expected that at full capacity, the Total Upgrader will process and convert 295,000 barrels per day of bitumen into light, sweet synthetic crude oil. ■

Project listings

Updated status of oil sands projects in Alberta

As of June 1, 2010.

TECHNOLOGY LEGEND

COGD	Combustion overhead gravity drainage
CSS	Cyclic steam stimulation
ET-DSP	Electro-thermal dynamic stripping process
N-SOLV	Heated solvent vapour extraction
SAGD	Steam assisted gravity drainage
THAI	Toe to heel air injection

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	START	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
ATHABASCA REGION – IN SITU						
ALBERTA OILSANDS						
Clearwater West	Pilot	4,500	2011	Application	Alberta Oilsands has received its first reserves assessment for the Clearwater West project area. Ryder Scott has assigned 2P reserves of 16.3 million and 3P reserves of 67.6 million barrels.	SAGD
	Commercial Project	15,000	TBD	Announced		SAGD
ATHABASCA OIL SANDS						
MacKay River	Phase 1	35,000	2014	Announced	AOSC has completed its 2010 winter program, including drilling 52 wells and shooting 21 square kilometres of 3-D seismic in its 40 per cent owned Dover area.	SAGD
	Phase 2	40,000	2017	Application		SAGD
	Phase 3	40,000	2019	Application		SAGD
	Phase 4	35,000	2012	Application		SAGD
Dover	Phase 1	TBD	2015	Announced		SAGD
BLACKPEARL RESOURCES						
Blackrod	Pilot	600	TBD	Application	BlackPearl says it plans to build the SAGD pilot at Blackrod later this year or early next. Construction of a 31-kilometre all-weather road to proposed site is complete, along with water source well, disposal well, and two observation wells. Engineering ongoing.	SAGD
CANADIAN NATURAL RESOURCES						
Birch Mountain East	Phase 1	60,000	2016	Announced		TBA
Gregoire Lake 1	Phase 1	60,000	2018	Announced		TBA
Grouse	Phase 1	60,000	2014	Announced		TBA
Kirby	Phase 1	45,000	2012	Application	Canadian Natural is proceeding with detailed engineering and design, and plans to sanction and scope in late 2010.	SAGD
Leismer	Phase 1	30,000	2018	Announced		TBA
CENOVUS ENERGY						
Borealis	Phase A	35,000	TBD	Application	Approximately 200 delineation wells have been drilled in the greater Borealis area as of Dec. 2009. Cenovus continues to evaluate the region in support of the project.	SAGD
	Phase B	32,500	TBD	Announced		SAGD
	Phase C	32,500	TBD	Announced		SAGD
Christina Lake	Phase 1A	10,000	2002	Operating	Approvals for E, F, and G are expected in 2011, and a wedge-well pilot has been launched at Christina Lake.	SAGD
	Phase 1B	8,800	2008	Operating		SAGD
	Phase 1C	40,000	2011	Construction		SAGD
	Phase 1D	40,000	2013	Approved		SAGD
	Phase 1E	40,000	TBD	Application		SAGD
	Phase 1F	40,000	TBD	Application		SAGD
	Phase 1G	40,000	TBD	Application		SAGD
Narrows Lake	Phase A	40,000	TBD	Announced	Cenovus plans to submit the application for Narrows Lake by the end of Q2.	SAGD
	Phase B	80,000	TBD	Announced		SAGD
Foster Creek	Phase 1A	24,000	2001	Operating	The Foster Creek project has achieved payout for royalty purposes, the result of cumulative project revenue exceeding cumulative project allowable costs. Cenovus says achieving payout is a reflection of strong operational performance and a superior resource. Approvals of phases F, G, and H are expected later this year. 12 per cent of production now comes from wedge wells.	SAGD
	Debottlenecking	6,000	2003	Operating		SAGD
	Phase 1C – Stage 1	10,000	2005	Operating		SAGD
	Phase 1C – Stage 2	20,000	2007	Operating		SAGD
	Phase 1D	30,000	2009	Operating		SAGD
	Phase 1E	30,000	2009	Operating		SAGD
	Phase 1F	30,000	2016	Application	Phases F, G, and H continue to move through the regulatory process.	SAGD
	Phase 1G	30,000	2017	Application		SAGD
	Phase 1H	30,000	TBD	Application		SAGD
CHEVRON CANADA						
Ells River		100,000	TBD	Announced	Chevron has decided to place Ells River on hold. The company does not believe the project will provide the necessary returns in the foreseeable future to compete for capital investment relative to others in its global portfolio.	TBA

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	START	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
CONNACHER OIL AND GAS						
Great Divide	Pod 1	10,000	2007	Operating	Connacher has filed an environmental impact assessment application to the ERCB and Alberta Environment for its proposed 24,000 bbl/d expansion. It hopes to commence construction in 2012.	SAGD
	Pod 2 (Algar)	10,000	2010	Operating		SAGD
	Expansion	24,000	2013	Disclosed		SAGD
CONOCOPHILLIPS CANADA						
Surmont	Phase 1	27,000	2007	Operating	According to the ERCB, production averaged 14,638 barrels per day in 2009.	SAGD
	Phase 2	83,000	2014 - 2016	Under construction	ConocoPhillips and 50/50 joint venture partner Total have sanctioned Surmont Phase 2.	SAGD
	Pilot	1,200	1997	Operating		SAGD
DEVON CANADA						
Jackfish	Phase 1	35,000	2007	Operating		SAGD
	Phase 2	35,000	2011	Under construction	Devon reports Jackfish 2 construction is now over 75 per cent complete.	SAGD
	Phase 3	35,000	TBD	Announced	Jackfish 3 regulatory application to be filed in Q3-2010.	SAGD
Kirby	Phase 1	TBD	2015	Announced	Delineation drilling expected to begin in the second half of 2010.	
ENERPLUS RESOURCES						
Kirby	Phase 1	10,000	TBD	Application	Enerplus says while it sees value in the project and it continues to move through regulatory process, minimal spending will occur in 2010. Enerplus anticipates approval in 2010.	SAGD
	Phase 2	25,000	TBD	Announced		SAGD
E-T ENERGY						
Poplar Creek	Pilot	1,000	2007	Operating		
		10,000	2011	Application	Expanded field test of ET-DSP electric production technology continues.	ET-DSP
EXCELSIOR ENERGY						
Hangingstone	Phase 1	1,000	2011	Application	Excelsior expects to hear whether it will receive funding from the Alberta government's Innovative Energy Technology Program and from the Climate Change and Emissions Management Corporation by mid-year.	COGD
GRIZZLY OIL SANDS						
Algar Lake		10,000	TBD	Application	Application filed March 2010.	SAGD
HUSKY ENERGY						
McMullen	Pilot	755	TBD	Application	Husky is currently working on a cold-production project at McMullen.	SAGD
Sunrise	Phase 1	60,000	2014	Approved	Husky says FEED for the first phase of Sunrise is complete and tenders for major engineering and construction contracts have been issued. Work continues on securing optimum transportation solutions for the movement of diluent to site and movement of diluted bitumen to the refinery. Sanction expected this year.	SAGD
	Phases 2-3	140,000	TBD	Approved		SAGD
IVANHOE ENERGY						
Tamarack	SAGD with HTL upgrading	20,000	2014	Announced	Winter drilling program (28 wells) complete. Application to be filed mid-2010.	SAGD
JAPAN CANADA OIL SANDS						
Hangingstone	Pilot	10,000	1999	Operating	Application filed April 29, 2010.	SAGD
	Phase 1	35,000	TBD	Application		SAGD
KOREA NATIONAL OIL CORPORATION						
BlackGold	Phase 1	10,000	2012	Approved	Phase 1 approved January 2010. Reports are that KNOC is looking to pick up more oilsands assets.	SAGD
	Phase 2	20,000	TBD	Application		SAGD
LARICINA ENERGY						
Germain	SAGD pilot	5,000	2012	Application	1,800 bbl/d project approved. Application to expand to 5,000 bbl/d and include cyclic-solvent SAGD underway.	SAGD
	Phase 1	10,000	TBD	Announced		SAGD
Saleski	Carbonate SAGD demonstration	1,800	2010	Under construction	Construction anticipated to be complete in Q4-2010.	SAGD
	Phase 1	10,000	TBD	Announced		SAGD
MEG ENERGY						
Christina Lake	Phase 1	3,000	2008	Operating	Production volumes ramping up.	SAGD
	Phase 2	22,000	2009	Operating		SAGD
	Phase 2B	35,000	TBD	Approved		SAGD
	Phase 3A	75,000	TBD	Application		SAGD
	Phase 3B	75,000	TBD	Application		SAGD
NEXEN						
Long Lake	Phase 1	72,000	2007	Operating	Nexen says it is "steadily climbing the growth curve" at Long Lake as it increases steam volumes post-turnaround, production of which has been limited, constraining production. Nexen says production levels have risen from 14,000 barrels per day in the Q4-2009 to approximately 25,000 barrels per day in April.	SAGD
	Phase 2	72,000	TBD	Announced		SAGD
	Phase 3	72,000	TBD	Announced		SAGD
	Phase 4	72,000	TBD	Announced		SAGD

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	START	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
Long Lake South	Phase 1	70,000	TBD	Approved		SAGD
	Phase 2	70,000	TBD	Approved		SAGD
N-SOLV						
	Pilot plant	2,000	TBD	Announced		N-SOLV
PARAMOUNT RESOURCES						
Hoole	Commercial project	TBD	TBD	Announced	Application to be filed in 2011.	SAGD
PATCH INTERNATIONAL						
Ells River		10,000	TBD	Announced	All of Patch assets have been successfully sold to a yet-unnamed working interest partner for $6 million.	SAGD
PETROBANK ENERGY AND RESOURCES						
Whitesands	Pilot	1,800	2006	Operating	Petrobank says it will recomplete its Whitesands wells with a permanent pump configuration based on experience with THAI at Kerrobert, Saskatchewan. This is expected to give more stable production than gas lift alone.	THAI
	Expansion	1,800	TBD	Approved	Expansion on hold in favour of capitalizing on existing infrastructure.	THAI
May River	Phase 1	10,000	2012	Application	Engineering, procurement, and construction management has been awarded for wellsites, pipelines, and central processing facility. Ordering of long lead items will commence during Q2. Start up could occur in mid-2012.	THAI
	Subsequent Phases	90,000	TBD	Disclosed		THAI
SOUTHERN PACIFIC RESOURCE						
STP-McKay		12,000	2012	Application	Southern Pacific has closed a $100-million bought deal equity financing and appointed Suncor veteran Ron Clarke as COO.	SAGD
STATOIL CANADA						
Kai Kos Dehseh-Leismer	Demonstration	10,000	2010	Under construction	Statoil says it is implementing a technology plan that will allow it to reduce oilsands carbon emissions more than 40 per cent by 2025.	SAGD
Leismer	Commercial	10,000	TBD	Application		SAGD
	Expansion	20,000	TBD	Application		SAGD
Corner		40,000	TBD	Application		SAGD
Thornbury		40,000	TBD	Application		SAGD
Corner	Expansion	40,000	TBD	Application		SAGD
Hangingstone		20,000	TBD	Application		SAGD
Thornbury	Expansion	20,000	TBD	Application		SAGD
Northwest Leismer		20,000	TBD	Application		SAGD
South Leismer		20,000	TBD	Application		SAGD
SUNCOR ENERGY						
Chard	Phase 1	40,000	TBD	Announced		SAGD
Firebag	Phase 1	33,000	2004	Operating		SAGD
	Phase 2	35,000	2006	Operating		SAGD
	Cogeneration and Expansion	25,000	2007	Operating		SAGD
	Phase 3	68,000	2011	Under construction	Firebag Phase 3 expected to be complete in the second quarter of 2011, followed by an 18-month ramp-up.	SAGD
	Phase 4	68,000	2012	Under construction		SAGD
	Phase 5	68,000	TBD	Approved	Suncor has received regulatory approval for stages 4 through 6 of its Firebag project.	SAGD
	Phase 6	68,000	TBD	Approved		SAGD
Lewis	Phase 1	40,000	TBD	Application		SAGD
	Phase 2	40,000	TBD	Application		SAGD
MacKay River	Phase 1	33,000	2002	Operating		SAGD
	Phase 2	40,000	TBD	Approved	Suncor will not be providing any further updates on next projects to move forward until late 2010.	SAGD
Meadow Creek	Phase 1	40,000	TBD	Approved		SAGD
	Phase 2	40,000	TBD	Approved		SAGD
SUNSHINE OILSANDS						
Harper pilot	Production mobility test	<1,000	TBD	Approved	Project is expected to commence construction in 2010.	SAGD
Legend Lake	Phase 1	10,000	TBD	Announced		SAGD
	Phase 2 (two stages)	40,000	TBD	Announced		SAGD
West Ells	Phase 1	10,000	TBD	Application		SAGD
	Phase 2 (two stages)	40,000	TBD	Announced	John Kowal, co-CEO of Sunshine Oilsands, will be presenting at TD Newcrest's 8th Annual Unconventional Oil & Gas Forum in Calgary on Thursday, July 15, 2010.	SAGD
	Phase 3	30,000	TBD	Announced		SAGD
Thickwood	Phase 1	10,000	TBD	Announced		SAGD
	Phase 2 (two stages)	40,000	TBD	Announced		SAGD
	Phase 3	25,000	TBD	Announced		SAGD

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	STATUS	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
TOTAL E&P CANADA						
Joslyn	Phase 1	2,000	2004	Suspended	Total E&P Canada is in the process of determining the best way forward for the assets on its Joslyn in situ lease.	SAGD
	Phase 2	10,000	2006	Suspended		SAGD
	Phase 3A	15,000	TBD	Withdrawn		SAGD
	Phase 3B	15,000	TBD	Withdrawn		SAGD
VALUE CREATION GROUP						
Terre de Grace	Pilot	10,000	TBD	Application	BP will become majority owner and operator of Terre de Grace project for $900 million.	SAGD
	Phase 1	40,000	TBD	Announced		SAGD
	Phase 2	40,000	TBD	Announced		SAGD
ATHABASCA REGION – MINING						
ATHABASCA OIL SANDS PROJECT						
Jackpine	Phase 1A	100,000	2010/ 2011	Under construction	Project partner Marathon Oil reports Expansion 1 is on track and anticipated to begin mining operations in the second half of 2010, and upgrader operations in late 2010 or early 2011.	Mining
	Phase 1B	100,000	TBD	Approved	Shell says it will wait at least five years until sanctioning any further expansion.	Mining
	Phase 2	100,000	TBD	Application		Mining
Muskeg River	Existing Facilities	155,000	2002	Operating	As a result of a turnaround, Marathon reports operations were completely shut down in April.	Mining
	Expansion and Debottlenecking	115,000	TBD	Approved		Mining
Pierre River	Phase 1	100,000	TBD	Application		Mining
	Phase 2	100,000	TBD	Application		Mining
CANADIAN NATURAL RESOURCES						
Horizon	Phase 1	110,000	2009	Operating	Annual production guidance for 2010 is 90,000 to 105,000 barrels per day as Canadian Natural moves closer to sustainable production.	Mining
	Tranche 2	6,000-15,000	TBD	Approved	Canadian Natural hopes to sanction Tranche 2 by the end of 2010.	Mining
	Tranche 3	10,000-20,000	TBD	Approved	Tranches 3 and 4 continue to be re-profiled based on learnings from Phase 1.	Mining
	Tranche 4	approx. 105,000	TBD	Approved		Mining
IMPERIAL OIL						
Kearl	Phase 1	110,000	2012	Under construction	Current construction includes work on piling, foundations, and starter dike, as well as vessel and pipe fabrication. About 2,000 workers are currently on the project.	Mining
	Phase 2	100,000	TBD	Approved		Mining
	Phase 3	100,000	TBD	Approved		Mining
SUNCOR ENERGY						
Fort Hills	Phase 1	165,000	TBD	Approved	Capital plans and sequencing for Suncor's next growth stages are under evaluation with a further update expected in Q4-2010.	Mining
	Debottlenecking	25,000	TBD	Approved	Project partner UTS says at best the project could be online by 2016, but must be online by 2019 because of lease retention.	Mining
Suncor – original operations	Millennium	294,000	1967	Operating	Suncor says both of its upgraders are now back up and running after maintenance relating to two fires, one in December and the other in February.	Mining
	Steepbank Debottleneck Phase 3	4,000	2007	Operating		Mining
	Millennium Debottlenecking	23,000	2008	Operating		Mining
	North Steepbank Extension		2010	Operating		Mining
Voyageur South	Phase 1	120,000	TBD	Application		Mining
SYNCRUDE (MILDRED LAKE AND AURORA)						
Syncrude – original operations	Stages 1 and 2	290,700	1978	Operating	Project partner Nexen says production was lower in Q1 than the previous quarter as a turnaround of the LC finer originally planned for Q2 was advanced to January. The turnaround was completed in mid March. Nexen says a coker turnaround is scheduled at Syncrude in Q3. Sinopec plans to buy ConocoPhillips's 9.03 per cent share of Syncrude for $4.65 billion.	Mining
	Stage 3 Expansion	116,300	2006	Operating		Mining
	Stage 3 Debottleneck	46,500	TBD	Announced		Mining
	Stage 4 Expansion	139,500	TBD	Announced		Mining
TOTAL E&P CANADA						
Joslyn	Phase 1 (North)	50,000	TBD	Application	Total's application continues to wind through the regulatory process.	Mining
	Phase 2 (North)	50,000	TBD	Application		Mining
	Phase 3 (South)	50,000	TBD	Announced		Mining
	Phase 4 (South)	50,000	TBD	Announced		Mining
Northern Lights	Phase 1	57,250	TBD	Withdrawn	Northern Lights asset is being integrated into Total portfolio. Will reinstate after new timing is determined.	Mining
	Phase 2	57,250	TBD	Withdrawn		Mining

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	[illegible]	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
UTS/TECK RESOURCES						
Frontier	Phase 1	100,000	TBD	Disclosed	UTS expects to be in a position to file its application for the integrated Frontier/Equinox project (where Equinox is a satellite to Frontier) in early 2011. Approval expected in 2014 followed by full-scale development.	Mining
	Phase 2	60,000	TBD	Disclosed		Mining
	Equinox Satellite	50,000	TBD	Disclosed		Mining
COLD LAKE REGION – IN SITU						
BP OIL SANDS (SHELL)						
Orion	Phase 1	10,000	2008	Operating	Production averaged 2,281 in February 2010.	SAGD
	Phase 2	10,000	TBD	Approved	Shell is reportedly slowing its oilsands investments in favour of less costly conventional resources.	SAGD
CANADIAN NATURAL RESOURCES						
Primrose/Wolf Lake	Wolf Lake	13,000	1985	Operating		CSS
	Wolf Lake SAGD	5,500	TBD	Application		SAGD
	Primrose South	45,000	1985	Operating		CSS
	Primrose North	30,000	2006	Operating		CSS
	Primrose East (Burnt Lake)	32,000	2009	Operating	After initial steaming at Primrose East, the company discovered oil seepage at surface on one of the new multiwell pads. Canadian Natural continues to work with regulators and has commenced surveillance steaming with average production targeted for 16,000 to 20,000 bbl/d in 2010, with a slow return to normal steaming operations by late 2010 or early 2011	CSS
	CSS Follow-up Process	25,000	2018	Application		CSS
HUSKY ENERGY						
Caribou	Demonstration Project	10,000	TBD	Approved		SAGD
Tucker	Phase 1	30,000	2006	Operating	Husky says that three additional well pairs were drilled in Q1. The wells are being equipped for tie-in and steaming will begin in Q3 with first production expected by year end.	SAGD
IMPERIAL OIL						
Cold Lake	Phases 1-10: Leming, Maskwa, Mahihkan	110,000	1985	Operating	Imperial reports that production has returned to normal levels.	CSS
	Phases 11-13: Mahkeses	30,000	2003	Operating		CSS
	Phases 14-16: Nabiye, Mahihkan North	30,000	TBD	Approved		CSS
KOCH EXPLORATION CANADA						
Gemini	Pilot	1,200	TBD	Application		SAGD
	SAGD Project	10,000	TBD	Application		SAGD
OSUM OIL SANDS						
Taiga	SAGD/CSS Project	25,000-35,000	2014	Application	Osum says it has been assigned proved-plus-probable-reserves totalling 320 million barrels in this year's independent engineering evaluation by GLJ.	SAGD
PENGROWTH ENERGY TRUST						
Lindbergh	SAGD Pilot	2,500	2012	Application	Approval anticipated in 2010. Pengrowth will spend $15 million on project in 2010.	SAGD
PEACE RIVER REGION – IN SITU						
ANDORA ENERGY (PAN ORIENT)						
Sawn Lake	SAGD Demonstration	700	TBD	Approved	Working on procurement of long-lead items.	SAGD
NORTH PEACE ENERGY						
Red Earth	CSS Pilot	1,000	2008	Operating	North Peace says second CSS cycle on one of its wells is underway, and the steam to oil ratio is performing 45 per cent better than during first cycle. North Peace has initiated a process to explore strategic alternatives to enhance shareholder value. Could include a sale or merger.	CSS
	Expansion	3,000	TBD	Announced		CSS
	Commercial Project	10,000	TBD	Announced		CSS
SHELL CANADA						
Carmon Creek	Cadotte Lake	12,501	1986	Operating		CSS
	Phases 1 and 2	80,000	TBD	Application	New application filed January 2010. Shell expects construction of first 40,000-barrel-per-day plant to commence in 2011, with a second 40,000-barrel facility three years following.	CSS
NORTHWEST SASKATCHEWAN – IN SITU						
OILSANDS QUEST						
Axe Lake	Reservoir Test	600	2008	Operating	Oilsands Quest says testing shows Axe Lake could be developed using "typical" SAGD.	
	SAGD Test	TBD	TBD	Application	Oilsands Quest has filed environmental applications for both projects with the Saskatchewan government and plans to file the application for the commercial project with Saskatchewan Ministry of Energy and Resources following a successful SAGD test.	
	Commercial SAGD	30,000	TBD	Application		

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)		REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
ATHABASCA REGION – UPGRADING						
CANADIAN NATURAL RESOURCES						
Horizon	Phase 1	135,000	2008	Operating	Annual production guidance for 2010 is 90,000 to 105,000 barrels per day as Canadian Natural moves closer to sustainable production.	Upgrader
	Tranche 2 & 3	135,000	TBD	Approved	Canadian Natural hopes to sanction Tranche 2 by the end of 2010. Tranches 3 and 4 continue to be re-profiled based on learnings from Phase 1.	Upgrader
	Tranche 4	145,000	TBD	Announced		Upgrader
NEXEN						
Long Lake	Phase 1	72,000	2008	Operating	Nexen says since its turnaround in Q4, the upgrader has experienced 90 per cent uptime, compared to 50 per cent before and is producing high-quality premium synthetic crude (PSCTM). The company says the gasification process is working, creating a low-cost fuel source which reduces its need to purchase natural gas for operations.	Upgrader
	Phase 2	72,000	TBD	Approved		Upgrader
	Phase 3	72,000	TBD	Announced		Upgrader
	Phase 4	72,000	TBD	Announced		Upgrader
	Phase 5	72,000	TBD	Announced		Upgrader
	Phase 6	72,000	TBD	Announced		Upgrader
SUNCOR ENERGY						
Suncor – original operations	Base U1 and U2	281,000	1967	Operating	Suncor says both of its upgraders are now back up and running after maintenance relating to two fires, one in December and the other in February.	Upgrader
	Millennium Vacuum Unit	43,000	2005	Operating		Upgrader
	Millennium Coker Unit	116,000	2008	Operating		Upgrader
Voyageur	Phase 1	156,000	TBD	Suspended	Capital plans and sequencing for the next stages of Suncor's growth to be announced in Q4-2010.	Upgrader
	Phase 2	78,000	TBD	Approved		Upgrader
SYNCRUDE						
Mildred Lake	Stages 1 and 2	290,700	1978	Operating	Project partner Nexen says production was lower in Q1 than the previous quarter as a turnaround of the LC finer originally planned for Q2 was advanced to January. The turnaround was completed in mid March. Nexen says a coker turnaround is scheduled at Syncrude in Q3. Sinopec plans to buy ConocoPhillips's 9.03 per cent share of Syncrude for $4.65 billion.	Upgrader
	Stage 3 Expansion	116,300	2006	Operating		Upgrader
	Stage 3 Debottleneck	46,500	TBD	Announced		Upgrader
	Stage 4 Expansion	139,500	TBD	Announced		Upgrader
VALUE CREATION						
Terre de Grace Upgrader	Phase 1	2,000	TBD	Application	BP will become majority partner in Terre de Grace project for $900 million.	Upgrader
	Phase 2	10,000	TBD	Application		Upgrader
INDUSTRIAL HEARTLAND REGION – UPGRADING						
ATHABASCA OIL SANDS PROJECT						
Scotford Upgrader 1		155,000	2003	Operating	Project partner Marathon Oil reports Expansion 1 is on track and anticipated to begin mining operations in the second half of 2010, and upgrader operations in late 2010 or early 2011.	Upgrader
	Expansion	90,000	2010	Under construction		Upgrader
Scotford Upgrader 2	Phase 1	100,000	TBD	Application	Alberta's Industrial Heartland Association says hearing for all phases to occur sometime in 2010.	Upgrader
	Phase 2	100,000	TBD	Application		Upgrader
	Phase 3	100,000	TBD	Application		Upgrader
	Phase 4	100,000	TBD	Application		Upgrader
BA ENERGY						
Heartland Upgrader	Phase 1	54,400	TBD	Approved	BA owner company Value Creation has received a cash injection of $900 million with the agreement for BP to become majority partner in Terre de Grace project.	Upgrader
	Phase 2	54,400	TBD	Approved		Upgrader
	Phase 3	54,400	TBD	Approved		Upgrader
NORTH WEST UPGRADING						
Upgrader	Phase 1	50,000	2013	Approved	The Alberta government reports that negotiations are underway with NWU to build the upgrader as part of its bitumen royalty in-kind initiative.	Upgrader
	Phase 2	50,000	TBD	Approved		Upgrader
	Phase 3	50,000	TBD	Approved		Upgrader
SUNCOR ENERGY						
Fort Hills Upgrader	Phase 1	165,000	TBD	Approved	Capital plans and sequencing for the next stages of Suncor's growth to be announced in Q4-2010.	Upgrader
	Phases 2 and 3	175,000	TBD	Approved		Upgrader
STATOIL CANADA						
Upgrader	Phase 1	75,000	TBD	Withdrawn	Application on hold indefinitely.	Upgrader
	Phase 2	175,000	TBD	Withdrawn		Upgrader
TOTAL E&P CANADA						
Northern Lights Upgrader	Phase 1	56,600	TBD	Withdrawn		Upgrader
	Phase 2	56,600	TBD	Withdrawn		Upgrader
Total Upgrader	Phase 1	150,000	TBD	Application	ERCB hearing underway.	Upgrader
	Phase 2	95,000	TBD	Application		Upgrader
	Debottlenecking	50,000	TBD	Application		Upgrader

Glossary of oil sands terms

API
An American Petroleum Institute measure of liquid gravity. Water is 10 degrees API, and a typical light crude is from 35 to 40. Bitumen is 7.5 to 8.5.

Barrel
The traditional measurement for crude oil volumes. One barrel equals 42 US gallons (159 litres). There are 6.29 barrels in one cubic metre of oil.

Bitumen
Naturally occurring, viscous mixture of hydrocarbons that contains high levels of sulphur and nitrogen compounds. In its natural state, it is not recoverable at a commercial rate through a well because it is too thick to flow. Bitumen typically makes up about 10 per cent by weight of oilsand, but saturation varies.

Condensate
Mixture of extremely light hydrocarbons recoverable from gas reservoirs. Condensate is also referred to as a natural gas liquid, and is used as a diluent to reduce bitumen viscosity for pipeline transportation.

Cyclic steam stimulation
For several weeks, high-pressure steam is injected into the formation to soften the oilsand before being pumped to the surface for separation. The pressure created in the underground environment causes formation cracks that help move the bitumen to producing wells. After a portion of the reservoir has been saturated, the steam is turned off and the reservoir is allowed to soak for several weeks. Then the production phase brings the bitumen to the surface.

Density
The heaviness of crude oil, indicating the proportion of large, carbon-rich molecules, generally measured in kilograms per cubic metre (kg/m^3) or degrees on the American Petroleum Institute (API) gravity scale; in western Canada, oil up to 900 kg/m^3 is considered light to medium crude—oil above this density is deemed as heavy oil or bitumen.

Diluent
see *Condensate*

Established recoverable reserves
Reserves recoverable under current technology and present and anticipated economic conditions, plus that portion of recoverabie reserves that is interpreted to exist, based on geological, geophysical, or similar information, with reasonable certainty.

Established reserves
Reserves recoverable with current technology and present and anticipated economic conditions specifically proved by drilling, testing, or production, plus the portion of contiguous recoverable reserves that are interpreted to exist from geological, geophysical, or similar information with reasonable certainty.

Extraction
A process, unique to the oil sands industry, which separates the bitumen from the oilsand using hot water, steam, and caustic soda.

Froth treatment
The means to recover bitumen from the mixture of water, bitumen, and solids "froth" produced in hot water extraction (in mining-based recovery).

Gasification
A process to partially oxidize any hydrocarbon, typically heavy residues, to a mixture of hydrogen and carbon monoxide. Can be used to produce hydrogen and various energy byproducts.

Greenhouse gases
Gases commonly believed to be connected to climate change and global warming. CO_2 is the most common, but greenhouse gases also include other light hydrocarbons (such as methane) and nitrous oxide.

Initial established reserves
Established reserves prior to the deduction of any production.

Initial volume in place
The volume calculated or interpreted to exist in a reservoir before any volume has been produced.

In situ
Latin for "in place." In situ recovery refers to various methods used to recover deeply buried bitumen deposits.

In situ combustion
A displacement enhanced oil recovery method. It works by generating combustion gases (primarily CO and CO_2) downhole, which then "pushes" the oil towards the recovery well.

Lease
A legal document from the province of Alberta giving an operator the right to extract bitumen from the oilsand existing within the specified lease area. The land must be reclaimed and returned to the Crown at the end of operations.

Muskeg
A water-soaked layer of decaying plant material, one to three metres thick, found on top of the overburden.

Oil Sands
Bitumen-soaked sand, located in four geographic regions of Alberta: Athabasca, Wabasca, Cold Lake, and Peace River. The Athabasca deposit is the largest, encompassing more than 42,340 square kilometres. Total deposits of bitumen in Alberta are estimated at 1.7 trillion to 2.5 trillion barrels.

Overburden
A layer of sand, gravel, and shale between the surface and the underlying oilsand. Must be removed before oil sands can be mined. Overburden underlies muskeg in many places.

Pilot plant
Small model plant for testing processes under actual production conditions.

Proven recoverable reserves
Reserves that have been proven through production or testing to be recoverable with existing technology and under present economic conditions.

Reclamation
Returning disturbed land to a stable, biologically productive state. Reclaimed property is returned to the province of Alberta at the end of operations.

Remaining established reserves
Initial reserves less cumulative production.

Royalty
The Crown's share of production or revenue. About three quarters of Canadian crude oil is produced from lands, including the oil sands, on which the Crown holds mineral rights. The lease or permit between the developer and the Crown sets out the arrangements for sharing the risks and rewards.

Steam assisted gravity drainage (SAGD)
An in situ production process using two closely spaced horizontal wells: one for steam injection and the other for production of the bitumen/water emulsion.

Synthetic crude oil
A manufactured crude oil comprised of naphtha, distillate, and gas oil-boiling range material. Can range from high-quality, light sweet bottomless crude to heavy, sour blends.

Tailings
A combination of water, sand, silt, and fine clay particles that is a byproduct of removing the bitumen from the oilsand.

Tailings settling basin
The primary purpose of the tailings settling basin is to serve as a process vessel allowing time for tailings water to clarify and silt and clay particles to settle, so the water can be reused in extraction. The settling basin also acts as a thickener, preparing mature fine tails for final reclamation.

Thermal recovery
Any process by which heat energy is used to reduce the viscosity of bitumen in situ to facilitate recovery.

Toe-to-heel air injection (THAI)
An in situ combustion method for producing heavy oil and oilsand. In this technique, combustion starts from a vertical well, while the oil is produced from a horizontal well having its toe in close proximity to the vertical air-injection well. This production method is a modification of conventional fire flooding techniques in which the flame front from a vertical well pushes the oil to be produced from another vertical well.

Truck-and-shovel mining
Large electric or hydraulic shovels are used to remove the oilsand and load very large trucks. The trucks haul the oilsand to dump pockets where it is conveyed or pipelined to the extraction plant. Trucks and shovels are more economic to operate than the bucket-wheel reclaimers and draglines they have replaced at oil sands mines.

Upgrading
The process of converting heavy oil or bitumen into synthetic crude either through the removal of carbon (coking) or the addition of hydrogen (hydroconversion).

Vapour extraction (VAPEX)
VAPEX is a non-thermal recovery method that involves injecting a gaseous hydrocarbon solvent into the reservoir where it dissolves into the sludge-like oil, which becomes less viscous (or more fluid) before draining into a lower horizontal well and being extracted.

Viscosity
The ability of a liquid to flow. The lower the viscosity, the more easily the liquid will flow.

CONTACTS

Oil Sands Producers

• Alberta Oilsands	www.aboilsands.ca
• Albian Sands Energy	www.albiansands.ca
• Andora Energy	www.andoraenergy.com
• Athabasca Oil Sands	www.aosc.com
• Baytex Energy	www.baytex.ab.ca
• Canadian Natural Resources	www.cnrl.com
• Chevron Canada	www.chevron.ca
• Connacher Oil and Gas	www.connacheroil.com
• ConocoPhillips Canada	www.conocophillips.ca
• Devon Canada	www.dvn.com
• EnCana	www.encana.com
• Enerplus Resources Fund	www.enerplus.com
• E-T Energy	www.e-tenergy.com
• Excelsior Energy	www.excelsiorenergy.com
• Husky Energy	www.huskyenergy.ca
• Imperial Oil	www.imperialoil.ca
• Ivanhoe Energy	www.ivanhoe-energy.com
• Japan Canada Oil Sands	www.jacos.com
• Korea National Oil Corporation	www.knoc.co.kr
• Laricina Energy	www.laricinaenergy.com
• Marathon Oil	www.marathon.com
• MEG Energy	www.megenergy.com
• Nexen	www.nexeninc.com
• North Peace Energy	www.northpec.com
• North West Upgrading	www.northwestupgrading.com
• N-Solv	www.n-solv.com
• Occidental Petroleum Corporation	www.oxy.com
• Oilsands Quest	www.oilsandsquest.com
• Opti Canada	www.opticanada.com
• OSUM Oil Sands	www.osumcorp.com
• Pan Orient Energy	www.panorient.ca
• Patch International	www.patchenergy.com
• Pengrowth Energy Trust	www.pengrowth.com
• Petro-Canada	www.petro-canada.com
• Petrobank Energy and Resources	www.petrobank.com
• Shell Canada	www.shell.ca
• Southern Pacific Resource	www.shpacific.com
• Statoil Canada	www.statoil.com
• Suncor Energy	www.suncor.com
• Sunshine Oilsands	www.sunshineoilsands.com
• Syncrude	www.syncrude.ca
• Talisman Energy	www.talisman-energy.com
• Teck Cominco	www.teckcominco.com
• Total E&P Canada	www.total-ep-canada.com
• UTS Energy	www.uts.ca
• Value Creation Group	www.vctek.com

Associations/Organizations

• Alberta Building Trades Council	www.albertabuildingtrades.com
• Alberta Chamber of Resources	www.acr-alberta.com
• Alberta Chambers of Commerce	www.abchamber.ca
• Alberta Energy	www.energy.gov.ab.ca
• Alberta Energy Research Institute	www.aeri.ab.ca
• Alberta Environment	www.environment.alberta.ca
• Alberta Finance and Enterprise	www.finance.gov.ab.ca
• Alberta Research Council	www.arc.ab.ca
• Alberta's Industrial Heartland Association	www.industrialheartland.com
• Canadian Association of Geophysical Contractors	www.cagc.ca
• Canadian Association of Petroleum Producers	www.capp.ca
• Canadian Heavy Oil Association	www.choa.ab.ca
• Canadian Oil Sands Network for Research and Development	www.conrod.ab.ca
• Energy Resources Conservation Board	www.ercb.ca
• Lakeland Industry and Community Association	www.lica.ca
• Natural Resources Conservation Board	www.nrcb.gov.ab.ca
• Oil Sands Developers Group	www.oilsandsdevelopers.ca
• Petroleum Technology Alliance Canada	www.ptac.org

For more information, visit us at

www.albertacanada.com

Published by
junewarren-nickle's energy group
junewarren-nickles.com